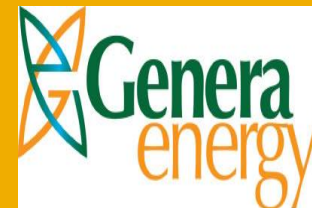


East TN Forum Monroe County  
Chamber of Commerce  
October 7, 2011



# Geothermal Opportunities for Local Governments



Tennessee  
Renewable  
Economic  
Council



- Choice Solar & Geothermal
- The Basics of Geothermal
- Advantages & Benefits
- Opportunities for Local Government



# “CHOICE” EVALUATE – REDUCE – PRODUCE

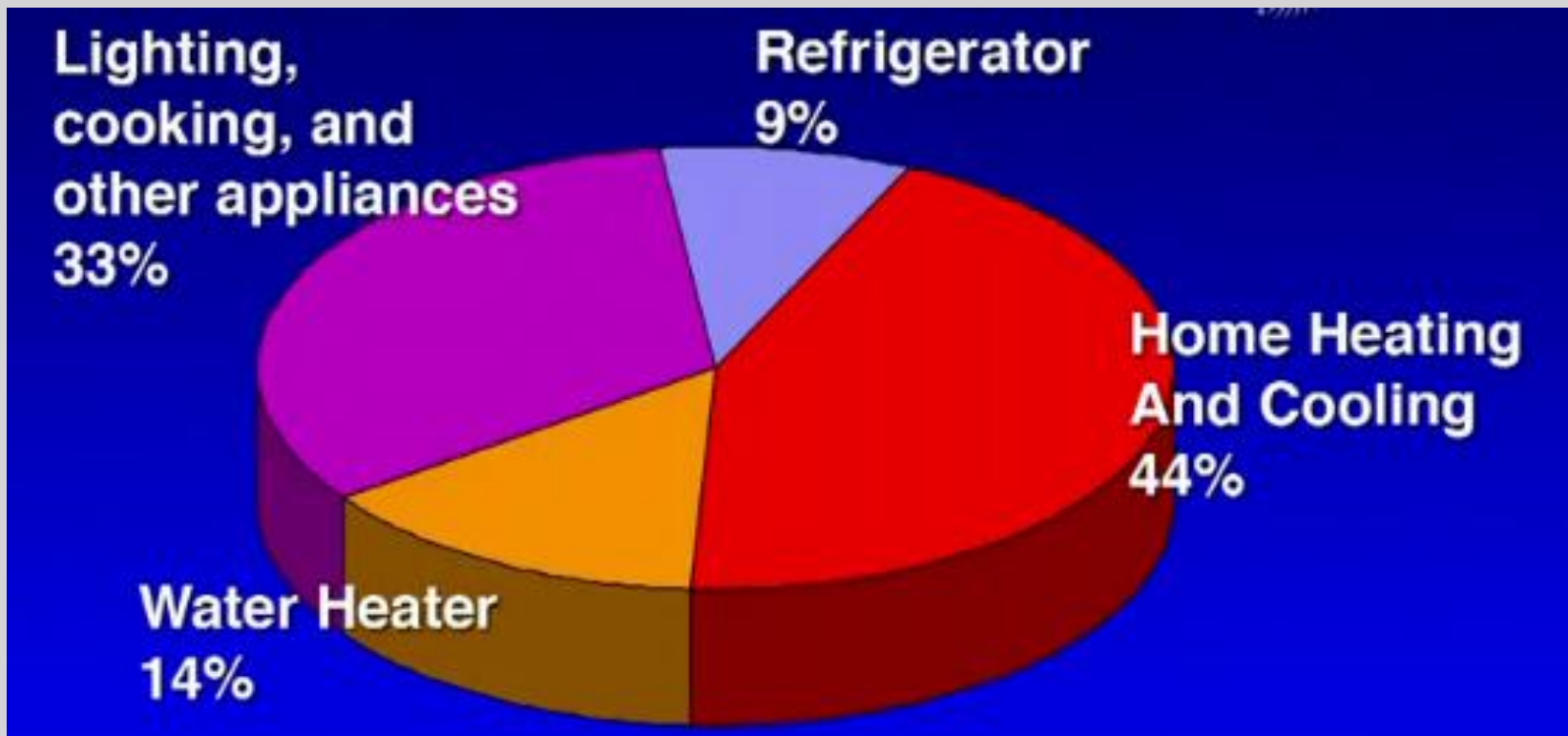
Our goal is to evaluate the needs of our customers and determine their interest and motivation in renewables. We help our customers get the greatest return on their investment by:

- Identifying available incentives
- Reducing energy consumption with Geothermal technology
- Producing renewable energy solutions with Solar Technology
- Promoting our customers interests...

Additionally, our goal is to continue to bring millions of dollars of energy grant funding into Tennessee.

# WHY USE GEOTHERMAL OVER TYPICAL HEATING & COOLING SYSTEMS

Most energy bills are for heating, cooling and hot water



The biggest potential for savings comes from increasing the efficiency of your heating & cooling systems

# CONVENTIONAL HEAT & COOLING SYSTEMS

**Winter:** Ordinary heat pump collect outdoor heat from the air and moves it indoors. As winter temperatures drop there is less and less available heat to collect.

**Summer:** Ordinary system collects indoor heat and expels it outside. When summer temperatures are 90° or more, outdoor air is already filled with heat and is less willing to accept more.

This exchange process becomes harder and harder on the unit. Therefore, the system becomes less efficient at a time you need it to be the most efficient.

**\*\* A geothermal system is not exposed to outdoor conditions \*\***

# THE BASICS OF GEOTHERMAL

## WHAT IS GEOTHERMAL HEAT PUMP?

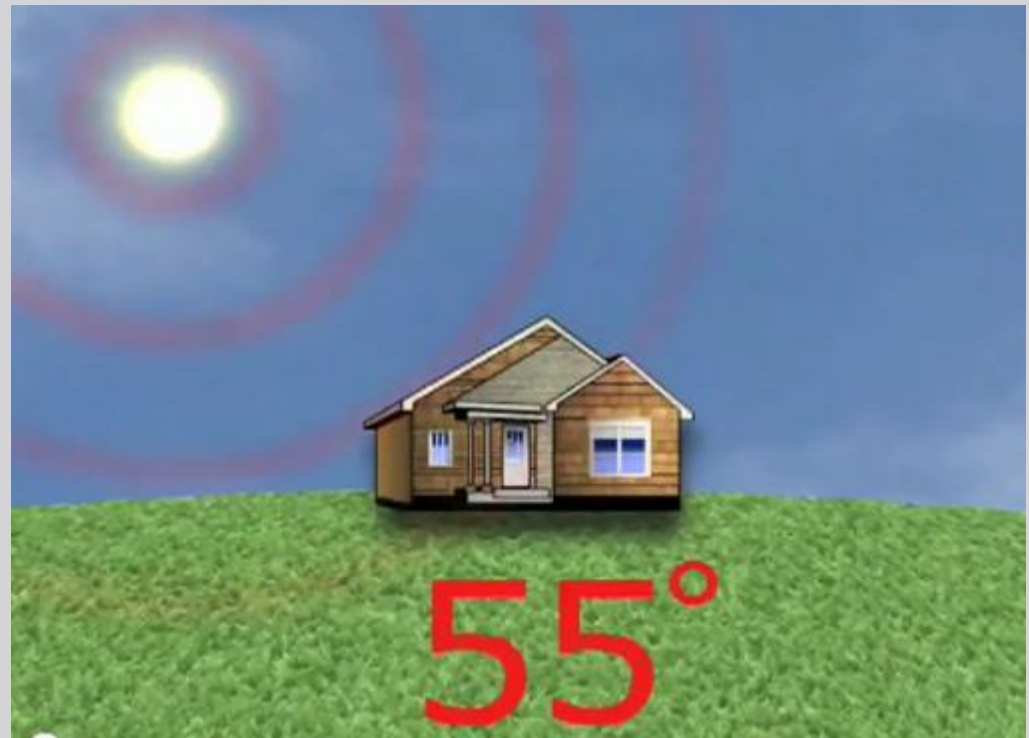
A geothermal heat pump, ground source heat pump (GSHP), geoexchange or ground heat pump is a central heating and/or cooling system that uses the natural warmth of the earth to heat and cool your building.



# FREE ABUNDANT SOURCE OF RENEWABLE ENERGY FROM THE SUN

About half of the sun's energy that reaches the earth is captured and stored in the ground at a constant temperature

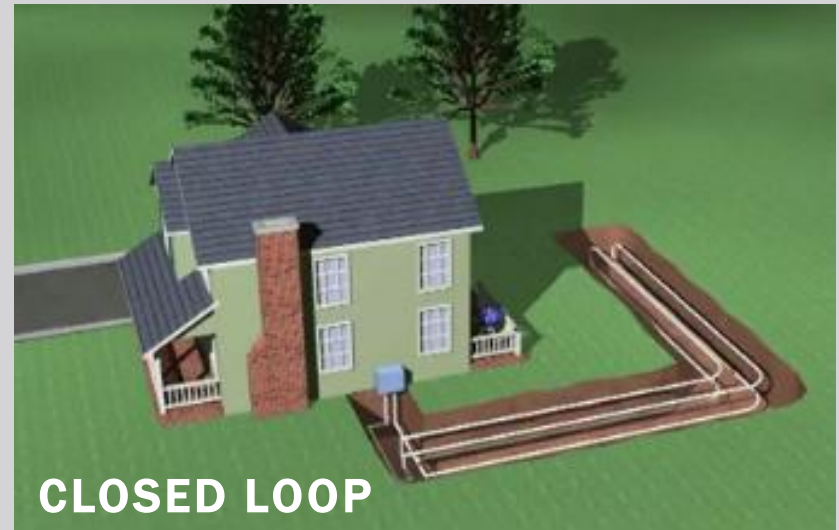
With Geothermal Technology there are two basic ways to capture and use this heat by drilling into the ground...



# OPEN LOOP & CLOSED LOOP SYSTEM



- Areas with a well or
  - Near a lake or river
  - Must have sufficient water available
  - More common in Rural Areas
- Water is pumped directly into the Geothermal unit and then discharged into a return well or a body of water.



- Most common - a piping system installed in the ground or in a pond depending on space available
- These systems can be placed:
- Vertically – Mostly Commercial use due to lack of space
  - Horizontally – Most cost effective on smaller projects with lots of space

# HOW DOES IT ACTUALLY WORK IN THE WINTER?



**1. The loop field is brought into the building where it connects with the heat pump.**

**2. The system circulates a water mixture through the entire loop.**

**3. The water absorbs the heat from the earth which is then compressed by the heat pump to a higher temperature and dispersed throughout the building as heat by forced air or radiant floor-heating.**

# HOW DOES IT ACTUALLY WORK IN THE SUMMER?



**1. The same process is reversed. Now the ground acts as a heat sink instead of a heat source.**

**2. Heat & humidity from inside are pulled out and put back into the cooler earth.**

**3. The cooler air is distributed throughout the building, providing air conditioning.**

**4. The result is a cool, dehumidified building.**

# ADVANTAGES & BENEFITS

- Greater Functionality
- More Energy Efficient
- More Environmentally Friendly
- Lower Operation & Maintenance Costs



**Geothermal systems are the most environmentally friendly, cost effective and energy efficient heating and cooling technology available.**

U.S. DEPARTMENT OF  
**ENERGY**

Energy Efficiency &  
Renewable Energy

**Geothermal Technologies Program**

# GREATER FUNCTIONALITY

- Installed as a retrofit or new construction
- Flexible design requirements – ideal install for commercial buildings
- Dependable – longer life span
- Quiet – no noisy outside unit
- Maintains a comfortable, even temperature
- Higher level of consumer satisfaction

# MORE ENERGY EFFICIENT AND ENVIRONMENTALLY FRIENDLY

- More than twice as efficient at cooling than any regular heat pump or air conditioner
- “Renewable Resource” = Tax credits available
- EPA- use of geothermal lowers electricity demand by approx. 1kW per ton of capacity
- Reduces foreign oil consumption by 2.15 million barrels annually
- No on-site combustion - no carbon monoxide
- USGBC Approved: 8-10 LEED points

# MORE ENERGY EFFICIENT



**Geothermal heat pumps help electric utilities achieve significant reductions in their peak demand loads**

**More Efficient “existing” infrastructures – provide the opportunity to meet the energy demands of new business.**

# LOWER OPERATION & MAINTENANCE COSTS

- The operating cost of geothermal can be up to 70% less than conventional systems.
- No cooling towers or heating elements to operate, which require additional energy
- Safe – with few moving parts
- Reduces electricity consumption in U.S. by 799 million kilowatt hours annually
- 4 to 6.8 year ROI

# OPPORTUNITIES FOR LOCAL GOVERNMENT

- 1. Opportunities for energy cost-savings:**
  - Municipal buildings
  - Businesses
  - Homeowners
- 2. Cost-savings allow for money to be reinvested in the community**
- 3. Reduces vulnerability to rising energy costs**
- 4. Increases educational opportunities – the standard, not the exception for next generation.**
- 5. Quality of life increase**

# OPPORTUNITIES FOR LOCAL GOVERNMENT PROMOTE AVAILABLE INCENTIVES

1. Energy Efficiency Block Grants
2. TVA Heat Pump Program
3. Federal Incentives
  - Commercial
  - Residential
4. Tennessee Incentives
  - TN Energy Efficient schools initiative – Loans
  - TN Local Government Energy Loan Program
  - TN Commercial Energy Efficiency Loan Program (Pathway Lending)

# TN DEPT. OF ECONOMIC DEVELOPMENT ANNOUNCES 3<sup>RD</sup> ROUND OF ENERGY EFFICIENCY BLOCK GRANTS

## **The purpose of the EECBG :**

- Provide funding to assist local governments in creating and implementing strategies to improve energy efficiency and reduce fossil fuel emissions in a manner that is environmentally sustainable.
- Approximately \$1,100,000 will be awarded to 10-12 eligible communities.
- Activities of the grant will benefit and serve residents, businesses, & non-profit organizations within the applicants' jurisdiction and utilize innovative financing to promote energy efficiency and renewable energy.

# TVA INCENTIVE

## TVA heat pump program – loan program (only with participating utilities)

- Amount: Single Unit: \$10,000
- Multiple and Advanced Units: up to \$12,500

[http://www.energyright.com/residential/heat\\_pumps.html](http://www.energyright.com/residential/heat_pumps.html)



TENNESSEE VALLEY AUTHORITY

# FEDERAL INCENTIVES

## ■ Commercial

- Federal Renewable Energy Grant, 1603 Program
  - 10% grant for total system cost; no cap; expires 12/31/2011
  - Grant expires and returns to 10% tax credit; no expiration date
- Modified Accelerated Cost-Recovery System (MACRS) + Bonus Depreciation
  - 100% bonus depreciation; expires 12/31/2011
- USDA Rural Development Rural Energy for America Program
  - 25% of total system cost, up to \$500,000
  - FY2012 budget is still unknown

## ■ Residential

- 30% tax credit for total system cost, expires 12/31/2016
  - Does not have to be taxpayer's principal residence

# TENNESSEE INCENTIVES

- **TN Energy Efficient schools initiative – Loans**
  - Applicable Sectors: Schools, (K-12)
  - Amount: \$66/student
  - Maximum Incentive: \$1 million/district for EESI loans and \$5 million for guaranteed energy savings project loans
  - Terms: 0% interest for 10 years and .75% interest for 12 years  
[http://dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=TN56F&re=1&ee=1](http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=TN56F&re=1&ee=1)
- **TN Local Government Energy Loan Program**
  - Maximum Incentive: \$500,000 Terms: 3% for loans over 7 years (0% for communities certified as "Three-Star")
  - Available to schools & local governments in TN  
[http://dsireusa.org/incentives/incentive.cfm?Incentive\\_Code=TN05F&re=1&ee=1](http://dsireusa.org/incentives/incentive.cfm?Incentive_Code=TN05F&re=1&ee=1)

# TENNESSEE INCENTIVES

## TN Commercial Energy Efficiency Loan Program (Pathway Lending)

- Available to businesses & non-profits
- Amount:\$20,000 - \$5 million  
Shared Savings Option: retain up to 50% of monthly energy savings, pay loan with remainder.
- Maximum Incentive:\$5,000,000, 100% of cost
- Terms:Interest Rate: 5% fixed, Repayment up to 10 years  
All loan costs may be financed; no prepayment penalty. Loan recipients must complete a third-party energy audit, assessment or vendor proposal with detailed project energy savings.

# IMPACT ON OUR COMMUNITIES & ECONOMIC DEVELOPMENT

## IN CONCLUSION

- The Positive Impact of Geothermal is Proven
- Wasted energy is wasted dollars
- Constituents reducing energy consumption allows them to reinvest in the community

Together as local officials, businesses and community leaders, we need to and can do more to promote and implement renewable energy solutions and incentives in Tennessee.